INVESTIGATOR'S ANNUAL REPORT

National Park Service

All or some of the information provided may be available to the public

Reporting Year: 2005	**Park:** Shenandoah NP
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Permit#:
SHEN-2004-SCI-0019

Park-assigned Study Id. #:
SHEN-00304

Project Title:
Biogeography and gall trait evolution in oak gallwasps (Hymenoptera: Cynipidae)

Permit Start Date: Oct 01, 2004	**Permit Expiration Date** Sep 30, 2006
Study Start Date: Oct 01, 2004	**Study End Date** Dec 30, 2006

Study Status:
Continuing

Activity Type:
Research

Subject/Discipline:
Invertebrates (Insects, Other)

Objectives:

Gallwasps (Family Cynipidae) are parasitic hymenopterans that are capable of inducing the growth of abnormal structures (galls) on trees, shrubs or herbs. The oak gallwasp tribe, Cynipini, contains species that induce galls on oak (genus Quercus) and other Fagaceae and is distributed throughout the northern hemisphere. This is the most species rich tribe, with around 1000 species in 27 genera (CsÃ³ka et al., 2004), and its members induce galls with greater variety and complexity than any other group of gall formers (Cornell, 1983). The adaptive significance of this morphological diversity remains largely untested; however, it is believed that certain traits offer protection from natural enemies (Stone and SchÃ¶nrogge, 2003). The principle aim of this investigation is to build a molecular phylogeny of the oak gallwasps to investigate patterns in host use and gall trait evolution and to trace historic dispersal events.

The need for taxonomic revision of the North American oak gallwasps was highlighted in a preliminary molecular phylogeny produced by Drown and Brown (1998). While this phylogeny lacked resolution, it demonstrated that several genera are in fact polyphyletic. A robust molecular phylogeny, based on several genes, produced from samples collected in his study, could provide a framework for taxonomic revision. It will allow the pattern and

frequency of gall character evolution to be mapped, providing a first step toward understanding the selection pressures involved. By comparison with parasitoid communities and climatic data, it may prove possible to determine the most important selection pressures. Re-evolution of characters within one region that are absent from another region may suggest the action of unique selection pressures. With a global phylogeny it will be possible to test the hypothesis (based on the current distribution of diversity) that oak gallwasps diversified in North America and then spread across Asia to Europe. Of particular interest are the four Holarctic genera, Andricus, Callirhytis, Dryocosmus and Neuroterus since the distribution of these genera may represent separate dispersal events.

Since North America has the richest oak gallwasp fauna in the world, it will not be possible to sample all species. A set of species encompassing the diversity in gall traits and host use will be specifically targeted. While oak gallwasps may be found wherever oaks grow, some require different species as hosts for each stage of their lifecycle. As such, oak gallwasp diversity should be greater in areas such as National Parks where oak density and diversity are high.

Findings and Status:

No activity was conducted this report year

For this study, were one or more specimens collected and removed from the park but not destroyed during analyses?

No

Funding provided this reporting year by NPS:	**Funding provided this reporting year by other sources:**
0	0

Fill out the following ONLY IF the National Park Service supported this project in this reporting year by providing money to a university or college

Full name of college or university:	**Annual funding provided by NPS to university or college this reporting year:**
n/a	0